Painful Nodules and Cords in Dupuytren Disease

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**Purpose** The etiology of Dupuytren disease is unclear. Pain is seldom described in the literature. Patients are more often disturbed by impaired extension of the fingers. We recently treated a series of patients who had had painful nodules for more than 1 year, and we therefore decided to investigate them for a possible anatomical correlate.

**Methods** Biopsies were taken during surgery from patients with Dupuytren disease and stained to enable detection of neuronal tissue.

**Results** We treated 17 fingers in 10 patients. Intraoperatively, 10 showed tiny nerve branches passing into or crossing the fibrous bands or nodules. Of 13 biopsies, 6 showed nerve fibers embedded in fibrous tissue, 3 showed perineural or intraneural fibrosis or both, and 3 showed true neuromas. Enlarged Pacinian corpuscles were isolated from 1 sample. All patients were pain free after surgery.

**Conclusions** Although Dupuytren disease is generally considered painless, we treated a series of early stage patients with painful disease. Intraoperative inspection and histological examination of tissue samples showed that nerve tissue was involved in all cases. The pain might have been due to local nerve compression by the fibromatosis or the Dupuytren disease itself. We, therefore, suggest that the indication for surgery in Dupuytren disease be extended to painful nodules for more than 1 year, even in the early stages of the disease in the absence of functional deficits, with assessment of tissue samples for histological changes in nerves.

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**Type of study/level of evidence** Therapeutic II.

**Key words** Dupuytren disease, nodules, pain, surgery.
## TABLE 1. Demographics

<table>
<thead>
<tr>
<th>No.</th>
<th>Sex</th>
<th>Age (y)</th>
<th>Duration of Pain</th>
<th>Preoperative Pain Intensity (Visual Analog Scale)</th>
<th>Preoperative Clinical Findings</th>
<th>Surgery Indication</th>
<th>Intraoperative Findings—Surgical Procedure</th>
<th>Complications</th>
<th>Biopsy Findings</th>
<th>Postoperative Pain Intensity (Visual Analog Scale)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>F</td>
<td>78</td>
<td>&gt; 1 y</td>
<td>4</td>
<td>Cords from palm to PIP, ring and little fingers (stage 2); Nodule, palm, middle finger</td>
<td>Pain</td>
<td>Nerve fiber in cord palm, little finger. Cords and nodule removed</td>
<td>Nerve fibers in fibromatosis</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>F</td>
<td>70</td>
<td>&gt; 1 y</td>
<td>7</td>
<td>Cord from palm to MCP, ring finger (stage 2)</td>
<td>Pain</td>
<td>Nerve fiber in cord palm, ring finger. Cord removed</td>
<td>Nerve fibers with perineural and intraneural fibrosis; neuroma</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>M</td>
<td>64</td>
<td>3 y</td>
<td>4</td>
<td>Cord from palm to PIP, ring finger (stage 3)</td>
<td>Pain</td>
<td>Nerve fiber in cord palm, ring finger. Cord removed</td>
<td>Nerve fibers in fibrous tissue</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>F</td>
<td>54</td>
<td>1 y</td>
<td>6</td>
<td>Nodule, palm, ring finger (stage 1); no trigger</td>
<td>Pain</td>
<td>Three nerve fibers in nodule, palm, ring finger. Broad nodule removed, ring finger, with release of stenosis of ring band A1, ring finger</td>
<td>Nerve fibers in fibromatosis with perineural fibrosis</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>M</td>
<td>74</td>
<td>3 y</td>
<td>4</td>
<td>Cord from palm to DIP, little finger; nodules, palm, ring and little fingers (stage 2)</td>
<td>Pain and restricted extension</td>
<td>Nerve fiber cord, little finger; tenosynovialitis palm, middle finger. Nodules and cords removed; tenosynovectomy, palm, middle finger</td>
<td>Nerve fibers in fibrous tissue; Pacini bodies</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>M</td>
<td>50</td>
<td>&gt; 1 y</td>
<td>6</td>
<td>Nodules, palm, thumb and ring finger (stage 1)</td>
<td>Pain</td>
<td>Nerve fiber cord, thumb and ring finger. Nodules removed, with release of stenosis ring band A1, ring finger</td>
<td>Neuroma in nodule, thumb; Meissner corpuscle in nodules, thumb and ring fingers</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>M</td>
<td>68</td>
<td>2 y</td>
<td>3</td>
<td>Cords from palm to PIP, ring and little fingers (stage 3)</td>
<td>Pain and restricted extension</td>
<td>Nerve fibers in cord. Cord removed</td>
<td></td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>M</td>
<td>61</td>
<td>3 y</td>
<td>3</td>
<td>Cord from palm to DIP, little finger (stage 4)</td>
<td>Pain and restricted extension</td>
<td>Nerve fiber in cord. Cord removed</td>
<td>Neuroma in cord</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>F</td>
<td>51</td>
<td>4 y</td>
<td>7</td>
<td>Cord from palm to PIP, ring and little fingers (stage 3)</td>
<td>Pain and restricted extension</td>
<td>Nerve fiber in cord. Cord removed; partial tenosynovectomy</td>
<td>CRPS (nerve fibers in fibrous tissue)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>M</td>
<td>59</td>
<td>&gt; 1 y</td>
<td>5</td>
<td>Cord from palm to PIP, ring finger; nodule, palm, middle finger (stage 3)</td>
<td>Pain and restricted extension</td>
<td>Nerve fibers in nodule. Cord and nodule removed</td>
<td>CRPS (nerve fibers with intraneural and perineural fibrosis)</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

DIP, distal interphalangeal joint; MCP, metacarpophalangeal joint; PIP, proximal interphalangeal joint.
All were right-handed. Five patients had contracture or nodules on the right side, and the 5 others had them on the left. Indication for surgery was persistent pain of at least 3 on a visual analog scale (0, no pain; 10, worst pain) for more than 1 year alone in 5 cases and with extension deficits in the remaining 5. The Dupuytren contracture was staged according to the classification of Iselin and Dieckmann:\(^5\): stage 1, nodules or cords without contraction; stage 2, metacarpophalangeal joint contraction; stage 3, metacarpophalangeal and proximal interphalangeal joint contraction; stage 4, same as stage III with hyperextension of the distal interphalangeal joint. Pain was evaluated before surgery on a visual analog scale. The type of pain was also recorded. Intraoperatively, special attention was paid to the digital and cutaneous nerve branches during dissection of the cords or nodules.

The 13 biopsies taken during surgery were stained with hematoxylin-eosin, and S-100 immunohistochemistry was performed to detect neuronal tissue.

At the last follow-up (mean, 25 mo after surgery; range, 12 to 31 mo), pain was again evaluated using the visual analog scale. All postoperative complications were recorded.

**RESULTS**

Our 10 patients had 17 fingers affected by Dupuytren contracture. The staging of the contractures is given in Table 1. None of the patients had been treated surgically for Dupuytren contracture before. The mean preoperative pain intensity on our visual analog scale was 4.9 (range, 3 to 7). The type of pain was described as searing (4), burning (2), prickling (2), or dull (2), mostly on direct pressure or by stretching the diseased finger. The patients had had symptoms for a mean of 3.7 years (range, 1–10 y).

Cords and nodules were removed from all patients. Trigger finger release and flexor tendon synovectomy were also performed in 2 cases each.

Nerve branches passing into or crossing the cords or nodules were seen in all cases (Fig. 1).

Of the 13 biopsies taken, 6 showed nerve fibers embedded in fibrous tissue (fibromatosis) (Fig. 2), and 3 showed perineural or intraneural fibrosis, or both. True neuromas (Figs. 3, 4) were found in 3 cases.\(^6\) Enlarged Pacinian corpuscles, as a sign of a possible Pacinian neuroma, (Fig. 5) were found in a further case.\(^7\)–\(^9\) Meissner corpuscles were isolated in the final case.

All patients were pain free at the last follow-up, 25 months (range, 12 to 31 mo) after surgery. There was...
no recurrence. Two patients had complications. One
developed complex regional pain syndrome (CRPS)
and was treated with physiotherapy and calci
tonium salmonis nasal spray (Miacalcin, Novartis Pharma,
Switzerland), leading to full functional recovery of the
operated hand. The second patient developed a hyper-
trophic scar and persistent swelling of the ring finger
with incomplete extension and probable CRPS after
resection of a palmar nodule in the middle finger and a
cord in the ring finger. He was treated with occupa
tional therapy, extension splints, local silicone appli
ations, and oral steroids. He finally had a loss of extension of
60° of the proximal interphalangeal joint of the ring
finger and 50° of the proximal interphalangeal joint of the small finger. Proximal interphalangeal joint arthrol
yis is planned.

DISCUSSION
We treated 10 patients with Dupuytren disease in dif
ferent stages. All reported pain of different types in the
region of the nodules or cords, whether a contracture
was present or not. Pain is rarely reported in Dupuytren
disease.1 Single nodules without finger contraction are
not considered an indication for surgery. Over the past
few years, however, we have seen 10 patients with
painful Dupuytren disease of more than 1 year duration
who asked for surgery because of the pain. None had
had hand surgery before.

To establish whether there is a correlation between
pain and anatomical changes, we examined the nodules
or cords during surgery and noted tiny nerve fibers
passing through them in all cases. We took biopsies and
asked our pathologists to look specifically for nerve
fibers. Nerve fibers embedded in the dense fibrous tis
ue of Dupuytren disease, as found in 6 of our cases,
have already been described in the literature.10 On
histological examination, 7 of our biopsies showed
changes in microstructure. Neuromas were found in 3
cases, and 3 other cases showed intraneural or perineu
ral fibrosis involving a pathological process affecting
nerve fibers. These findings might be a consequence of
local nerve compression by the fibromatosis. Because
fibrous tissue is inelastic, persistent compression of a
nerve might be followed by a decrease in axonal trans
port and perfusion of the nerve, ultimately leading to
fibrosis of the nerve or development of pseudoneu
roma.11–13 It is also possible that Dupuytren disease
itself might cause local growth factors to be released14
and result in morphological changes in nerve fibers.
Pain might, therefore, be the consequence of compres
sion of altered nerve fibers in this inelastic envi
ronment.10,15

Dupuytren disease is also related to inflammation
and has been associated with sprouting of substance P
positive nerve fibers,16 which are one of the origins of
pain in Achilles tendinosis.17 This pathophysiological
mechanism might also explain pain in the early stages
of Dupuytren disease. Two of our cases developed
CRPS after surgery. This is found in 5% to 40% of
cases after fasciectomy for Dupuytren disease.18 Tissue
trauma, as occurs in fasciectomy, amplifies cytokine
signaling. Cytokines can excite nociceptors and en
hance the release of neuropeptides such as substance P,
resulting in neurogenic inflammation. Levels of sub
stance P were higher in patients with CRPS.19 This
process might have occurred in our 2 patients with
CRPS.

Enlarged Pacinian corpuscles (hyperplasia) are
found in Dupuytren disease.8,9,20 One of our cases had
enlarged Pacinian corpuscles and an increased density
of these corpuscles. The increase in density and en
largement of Pacinian corpuscles might be linked to
local release of growth factors,14 as the capsules of the
Pacinian corpuscles were strongly positive for nerve
growth factor receptor.20 Such enlarged Pacinian cor
puscles can be present in patients with no pain21 but can
also cause pain.7
All our patients were free of pain after resection of the fibrous tissue. Even though they described different kinds of pain, as is also seen in other compressive nerve disorders, other nerve compression syndromes were not present in our patients.

Although all our patients were pain free after surgery, this does not mean that our small sample has shown that pain in Dupuytren disease is linked to the histological changes described. Pathological findings in biopsies taken from larger samples of patients with and without pain are required, with examination of many thin sections throughout the entire specimen with special dying techniques for nerve fibers.

We, therefore, suggest that the indication for surgery in Dupuytren disease be extended to the presence of painful nodules for more than 1 year, even in the early stages of the disease in the absence of functional deficits, and include an assessment of tissue samples for histological changes in nerve fibers.

REFERENCES


